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DOMINION OF CANADA

DEPARTMENT OF THE INTERIOR

Hon. Thomas G. Murphy, Minister — H. H. Rowatt, Deputy Minister

F. H. Peters, Surveyor General and Director, Topographical Survey

ANNUAL REPORT

OF THE

TOPOGRAPHICAL SURVEY

FOR THE

FISCAL YEAR ENDED MARCH 31, 1932

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TOPOGRAPHICAL SURVEY

REPORT OF THE DIRECTOR AND SURVEYOR GENERAL, F. H. PETERS

The Topographical Survey is a centralized mapping organization, and includes the function of making available for general use all the detailed and accurate knowledge of the physical features of the country, so valuable for the purposes of development, which is available from the scientific study of aerial photographs. It also includes centralization of aerial photographic plotting for all government departments and the general public.

Built upon experience of the most economical and practical procedure the co-operative policy with the Royal Canadian Air Force, which has been responsible for the procuring of the aerial photographs, has been based upon maintaining the photography one year ahead of the ground control field work and the plotting. Therefore, though the transfer of the natural resources to the western provinces resulted in a reduction and rearrangement of staff and a curtailment of field work there was no diminution in the office plotting requirements for the current year, and in addition the Air Force completed a large area of new photography during the season. Through the extension of co-operation with provincial survey organizations sufficient ground survey work was made available to provide the necessary control for compiling and plotting the photographs.

The widespread activities of the Survey in meeting the ever-increasing demand for maps showing detailed information all over the Dominion is indicated by the lists given later in this report, showing the number of map sheets printed and in hand.

The area covered during the year by newly issued map sheets, exclusive of a number of general map sheets, aerial navigation maps, etc., totals 99,908 square miles. Of this amount, 58,318 square miles are covered by map sheets of the National Topographic series—standard, provisional, and exploratory editions—and the remainder by sheets of the Sectional Map series and other map sheets designed to meet special needs.

To keep the public informed of the new map sheets as issued articles describing them briefly and in popular language were sent to leading newspapers and widely published. A certain proportion of the map sheets are issued in folder covers and to supplement the information shown on the maps a short description of the country is, in each case, printed on the folder. An index of the map features is also printed on each folder and these indexes will, it is hoped, form the basis for a gazetteer of place names at some time in the future. In the meantime they serve a useful purpose in quickly locating any map features.

Aerial Surveys

Aerial surveys have become, within the last few years, one of the major activities of the branch. The aerial photography itself is carried out by the Royal Canadian Air Force under instructions issued by this office, where the photographs are indexed, plotted and filed for reference in the Aerial Photographic Library. During the season of 1931, an exceptionally large area, totalling about 76,000 square miles, was covered by photography. Of this 54 per

cent, or 41,000 square miles, were covered by oblique photography, and 46 per cent, or 35,000 square miles, by vertical photography. New prints to the number of 111,351 were received and filed in the Aerial Photographic Library, together with, in some cases, duplicate copies for field use and plotting.

During the year the plotting of aerial photographs very closely approximated the same total area covered by photography. In the oblique plotting division 14 map sheets or special areas were plotted covering in all 54,570 square miles, while in the vertical division eight full map sheets and substantial portions of five other map sheets were completed, having a total area of 12,500 square miles. This compares very favourably with the work produced in other years.

Maps issued from aerial photographs have usually been provisional editions, which, while complete with respect to the horizontal details of the topography, do not show the vertical features of the terrain, such as hills and valleys. While this information can, in a very large measure, be obtained from a stereoscopic study of the vertical aerial photographs, the urgent demand for many of these maps made it inexpedient to delay their publication solely on that account. Experimental work to this end has already been carried out, and when opportunity occurs it may be possible, with a small expenditure for field work, to add this important feature to all these maps.

Résumé of Aerial Operations

The season of 1931 marks the end of the first ten-year period since the inauguration of aerial surveys in Canada, and it would seem fitting to include in this report a brief résumé of the progress that has been made in that period.

In 1922 an arrangement was made with the Royal Canadian Air Force for the photography of some experimental areas, and a few rolls of oblique photographs were taken in northern Manitoba, and a small area covered with vertical photographs in Saskatchewan. During the winter original plotting methods were worked out, and the following year some considerable areas were covered by oblique photography. With the experience gained on that season's work an extensive program was launched in 1924. From that year onward the work has steadily progressed, each year making a deeper inroad into the little known expanses of our northern frontier, and at the same time covering with accurate maps the areas where important developments are taking place in industry and mining.

Up to the present time a total area of 402,500 square miles has been covered with aerial photography, of which 125,000 square miles are of the vertical, and 277,500 square miles of the oblique type. The vertical photograph is used for mapping on fairly large scales or where the country is rough or mountainous, while the oblique type is pre-eminently adapted for the exploratory mapping of those vast areas of forest and lake which represent so large a percentage of our unsettled areas. The photography has, for the most part, been done by the Royal Canadian Air Force through a co-operative arrangement, and to provide for uniformity and the prevention of duplication, the Topographical Survey has been made the centralizing agency for the control of all the aerial photography and surveying required by the various departments of the Government of Canada. This control provides for the issue of instructions for the photographic operations, the indexing and filing of all prints taken, and the plotting and compilation of maps from aerial photographs. Marked economies have resulted from this centralization, and from the careful control that has been exercised to ensure that photographs taken for one purpose will meet the requirements of other potential users.

The methods used in plotting the photographs have for the most part been developed in this country to meet Canadian conditions. In particular the oblique method is known as the Canadian method and it has been adopted in

other countries where conditions are similar. This method, because of its low cost, flexibility and the small amount of ground surveys required for control, is probably the most economical method of aerial surveying so far evolved. Through its use it has been possible to extend our exact geographical knowledge of Northern Canada to a greater extent in the last ten years than in the preceding century of exploration and discovery, and to accurately depict the myriad lakes and watercourses of the great Laurentian plateau for the prospector, lumberman, traveller, and others who are interested in the development of our natural resources. These explorations have kept pace with the remarkable development in mining which have been a feature of the period, and for which they have, in no small measure, been responsible.

To indicate the attention that has been given to this phase of the work it may be stated that no less than thirty-seven map sheets on a scale of four miles to the inch, each covering between 5,000 and 6,000 square miles, have been issued. In the same period twenty-eight map sheets from vertical photographs on scales of from one to three miles to the inch, have also been published. These maps cover areas from the Atlantic to the Pacific, and far into the Northwest Territories. An endeavour has been made to furnish accurate maps of districts where new mining discoveries are taking place. Thus the aerial work in the Patricia portion of the District of Kenora, Ontario, coincided with the activities at Red lake and Trout lake. The discovery of the Flin Flon and Sherritt-Gordon mines in northern Manitoba diverted the interest in aerial surveys to that locality, while within the last year the mineral discoveries at Great Bear lake have necessitated extensive aerial surveys, and the publication of accurate maps of that remote district. To meet the urgent demand from parties entering that area early this spring, special efforts were made to expedite the preparation of this map, which, although it covered an area of 2,000 square miles, was rushed through all the stages of plotting and publication within a month of the time the ground control surveys were received.

To actually locate the position on the earth's surface of an aerial photograph, or the plot from a photograph, ground surveys are necessary. The density of this ground control is dependent on the scale of the map and the type of photograph, vertical or oblique, which is being used. Ordinarily vertical photographs require control at fifteen- or twenty-mile intervals, while oblique photographs may be carried for fifty miles between controls. This control has usually been a careful traverse survey, but recently, through improved types of surveying instruments and the use of wireless telegraphy in the determination of longitude, it has been found possible to adequately control certain aerial surveys by the astronomical determination of the position of a number of points. This method is particularly advantageous in remote districts where ground surveys are expensive, and by attaching an observer to a photographic detachment which transports him to and from the points where observations are required, an aerial photographic detachment can be organized as a complete surveying unit. This unit will not only take the photographs for mapping the area, but provide the control needed to plot them, thus completing the whole survey at the one time and with a minimum of expense.

This ten-year period has seen the development of aerial surveys from a very modest beginning, working with improvised material, by untried methods, to a well organized service, carried on by a highly trained staff and using methods that have been developed far beyond the original methods of earlier years. This progress has at least kept pace with similar work in other countries, all of which has been closely studied. New instruments and apparatus have assisted in speeding up the plotting which uniformly shows increasing accuracy at a smaller cost. The areas already photographed, considerable as they may be, are only a fraction of Canada's total area, and much remains to complete even an

elementary knowledge of the topography of the whole of Canada. The commencement of a new decade finds the aerial organization admirably equipped to carry this work into wider fields.

THE AERIAL PHOTOGRAPHIC LIBRARY

The Aerial Photographic Library now contains more than 560,000 prints, and is probably the largest collection of the kind in the world. These photographs are all carefully indexed as to locality and filed in a convenient manner so that they are readily accessible for reference and study. Facilities are provided at the library for their examination, and under restriction they may be loaned for short periods to responsible parties.

This library performs a unique service to those interested in the physical and geographical features of the country, either from a purely scientific standpoint, or with a view to the development of Canada's resources. In effect each part of the country photographed is brought directly under the reader's eye, as though he was actually flying over the district in person, with the additional advantage of being able to make his observations at leisure and with the aid of the optical and mechanical appliances that have been developed to bring out the details of the topography. Expert assistance in the interpretation of aerial photographs is available at the library and an effort is made to extend the use of the photographs over wider fields in order that the fullest value may be obtained from the important investment which these photographs represent.

For the most part the photographs were originally taken for mapping purposes, and have already been plotted into map sheets. In addition, however, to the information that can be shown on any map of reasonable scale, they contain a wealth of detail which is either of too minute a character or is not of sufficiently general interest to be shown on a map, but at the same time is of the greatest value to persons having a particular interest in the locality in question. The map may be called the generalized representation of the topography, while the photograph is the authority on the intimate physical features of an area.

The uses to which aerial photographs are being put are almost as numerous as the activities of a pioneering country. Foresters require them for the inventory and classification of forests, and for the economical planning of logging operations. Geologists and prospectors find the photographs of great value in their work. In the first place, by showing rock exposures, they eliminate unproductive areas where the rock is deeply covered with soil, and enable the work to be concentrated on more promising districts. Structural features, such as faulting or folding, dykes, and contacts, can frequently be found in the photographs, and in many cases features which have actually been missed in a careful ground examination have been picked up from the photographs by the correlation of isolated and often insignificant indications. In physiography, and the determination of the origin of different types of surface and soil, aerial photography has produced remarkable results which have not only a scientific but frequently a practical value as well. As an example, a landslide area was located in Manitoba over thirty miles in length, and having an area of about sixty square miles, and other smaller, though still immense slides were also found at widely separated points where conditions were somewhat similar. Knowledge of the possibility of these immense disturbances has an important bearing on any development in these districts. Glacial deposits and phenomena are readily detected, and when larger areas have been photographed and the information which they will show has been correlated, useful knowledge may be gained concerning the movements of those great ice-sheets which, it is supposed, once covered almost the whole of the Dominion.

Interesting developments have taken place with respect to the use of aerial photographs in engineering work, and aerial methods have been successfully

applied to the delimitation of water storage reservoirs, to the location and study of power sites, to railway, road, and transmission line location, and other similar projects. Engineering projects are in many cases carried out in isolated districts, heavily wooded and difficult of access, where the acquisition of data, even of a preliminary nature, is a costly and lengthy procedure. It has been found that a stereoscopic examination of aerial photographs will, in many cases, furnish the engineer with at least these preliminary data, and permit him to make his decisions and plan his work with a full knowledge of the physical features of the project, and with a minimum of expenditure. This preliminary work will indicate the points where accurate measurements are required, and the work can be directed to obtain the most efficient results. In one large project now under construction, a year was saved in preliminary examinations by the use of aerial photography, and aerial methods in one form or another have been employed on nearly every large hydro-electric plant constructed in this country within recent years. Power companies have made great use of the facilities afforded by the library.

The Hydrographic Survey has made extensive use of aerial photographs for charting shorelines and underwater features, and the Departments of Public Works, and Railways and Canals have employed them in connection with numerous projects or investigations.

Cities and municipalities require photographs for laying out streets and improvements; railways for projecting new lines or divisions; and private property owners for the delineation or development of their own holdings.

Hundreds of requests for photographs and information are handled each year by the library, ranging from a single photograph to hundreds of prints. When required, special reports are prepared on various subjects, some of which are of more than ordinary interest. In one case a mosaic was made for the Department of Public Works to show the relative velocities of water through Seymour narrows on the coast of British Columbia. This information was obtained by a stereoscopic study of a series of aerial photographs taken under rigorous conditions at proper stages of tide, and work of this kind which appears at first glance entirely beyond the scope of aerial surveys is an example of the possibilities of extending this service into new fields.

Topographical Mapping

The interpretation on the ground of the details appearing in vertical photographs was completed over an area of 1,686 square miles in the vicinity of Orillia, Ont. The district comprises a part of one of the most popular summer resorts in Canada. In addition some topographical information was obtained in the vicinity of Moncton, N.B., for the completion of the Moncton standard topographical map sheet at the scale of two miles to one inch.

The office work of the division consisted of drawing up specifications and preparing instructions for all maps prepared by the Survey; the assembly of the various material into map sheets; the preparation for the draftsmen of all the map content lists comprising all the writing material to appear on the map; the selection of place names and their submission to the Geographic Board; the preparation of all the notes, diagrams, charts, and key maps to appear on the map sheet borders; the addition of all information regarding altitudes; and the checking of all map manuscripts, fair copies, and map proofs to insure that everything is up to standard.

During the year this work was done on 73 map sheets of the National Topographic series and 18 other map sheets. Of the National Topographic series 4 maps were at the one-mile scale, 43 at the two-mile scale, 23 at the four-mile scale, and 3 at the eight-mile scale. Of the miscellaneous maps 5 were for air navigation purposes and 5 were of national parks.

Co-operation with the different provinces was continued and progress was made toward closer association in all the mapping activities of the branch. In the selection of place names this co-operation is most advantageous in eliminating so far as possible objectionable and duplicated names in contiguous areas. In outlying districts reports and sketches are consulted, in order to preserve the names applied by the early explorers.

A combined index of the maps published by the Department of National Defence and those of the National Topographic series was prepared and published in co-operation with the Department of National Defence. This was simplified by the fact that the boundaries of the regular maps published by the Department of National Defence conform to those of the National Topographic series.

To avoid duplication of work and to insure that all available information is included in the maps issued by the Branch, this division keeps in touch with the other survey organizations throughout Canada, collecting and filing for reference the data gained by them, both horizontal and vertical. The division also collects and records the information regarding the progress made in topographical mapping the world over, noting any improvements in the instruments or methods employed.

The maps issued by the Survey may be generally divided into three groups or series: the National Topographic series, the Sectional Map of Canada, and the National Parks and Miscellaneous maps.

In mapping such a large area as Canada it is obviously essential to have a carefully laid out program that will progress in an orderly and economical manner. Advantage has been taken of the experiences of older countries. Such experiences show that in order to avoid overlapping of map sheets with consequent duplication of field and office work and necessarily higher costs, it is essential that the map sheets shall be bounded by definite limits. This has been attained by dividing the whole of Canada into a series of map sheets at scales of one, two, four, eight, and sixteen miles to the inch, the boundaries of which are latitude and longitude lines. Each of these sheets of the National Topographic series, whatever its scale, is an integral part of the series, and all the regular field and office work is planned for the production of map sheets with these definite limits. Without such definiteness of boundary, numerous other considerations tend to prevent the uniformity of size and shape, and this lack of uniformity inevitably tends eventually to duplication of considerable office work and frequently also duplication of field work. This policy does not debar the Survey from preparing maps of special areas when other considerations are sufficiently strong to justify a departure from the regular practice.

In the preparation of this index a study was made of the programs of other countries. It is in harmony with the system followed by the Department of National Defence. It is also suited to the compilation in due course of map sheets of the International Map of the World. This latter is a definite policy which has been adopted by all the principal countries of the world, to issue map sheets to standard specifications and scales. Adherence to the program of mapping of this Survey in producing maps of the National Topographic series will automatically permit a full participation by Canada in this world program with a minimum of extra expense.

Incidentally the index to map sheets provides a logical and simple method of reference for the different maps, the form of the reference indicating at once the scale of the map referred to, and—for those familiar with the system of the index—the location of the area mapped.

The system of projection adopted for the maps of the National Topographic series was selected after full consideration had been given to all the lessons learned by the different Survey forces during the war. The matter was first started by the late Dr. E. Deville, at that time Surveyor General of the

Department, who personally discussed the problem of the map projection best suited to the needs of Canada with the most eminent mathematicians and cartographers of France and Britain. The projection is termed the Gauss Conformal, or to give it its descriptive name, a meridional cylindrical orthomorphic projection with standard sub-meridians. It is also frequently termed a Transverse Mercator projection, from the fact that it is developed from a meridian exactly as the Mercator projection is developed from the equator, consideration being given, of course, to the spheroidal shape of the earth.

For topographic mapping purposes it has been found necessary to divide Canada into lunes, each covering 8° in longitude (approximately 400 miles in the latitudes of Southern Canada) and unlimited in the north-and-south direction. These lunes are, therefore, the basis of these map boundaries; they are shown on this index bounded by the meridian lines in heavy red. Within the limits of one of these lunes, unlimited in the north-and-south direction, every map sheet, whether on the one, two, four, eight or sixteen-mile scale is laid down on the same system of map projection and consequently will fit exactly to the neighbouring map sheets; and, further, a mathematical system of squares called a "grid" may be extended over the whole area.

The adoption of a grid system is considered particularly valuable to Canada at this early stage in its survey and mapping development. For example, it provides a connection between points in the industrial area of southern Ontario and points in the mining areas of northern Ontario, enabling the distances and bearings between such points to be computed, even though the intervening area be unmapped or poorly mapped. The value of this to aeroplane companies, power companies, and other organizations (where costs for flying, power transmission, etc., depend upon the straight line distance) is at once apparent. A grid system is always useful as a system of map reference. This is particularly true for areas where many topographical features are unnamed and where it is necessary to refer to them. The map projection and grid system adopted by this Survey has been properly designed with all the needs of Canada in view.

The first map sheet of the National Topographic series was printed in 1926. Up to March 31, 1932, the following map sheets of this series have been issued:—

Edition	Number of map sheets	Scale	Area, square miles
Standard	15	1 mile to 1 inch	6,022
"	4	2 miles " 1 inch	6,180
"	2	4 miles " 1 inch	12,428
Provisional	10	2 miles " 1 inch	16,452
"	30	4 miles " 1 inch	177,146
"	1	8 miles " 1 inch	23,470
Exploratory	6	4 miles " 1 inch	30,529
"	1	8 miles " 1 inch	20,700
Total	69		292,927

The Sectional Map of Canada was designed to cover the area of Canada to which the Dominion Lands Survey system applies. It is based on the initial meridians and base lines, the north and south boundaries of the sheets being every second base line.

There are three classes of Sectional sheets issued by this Survey:—

First, sheets covering the more fully settled areas; these are complete topographic sheets showing all details consistent with the scale; the information is obtained by ground surveys organized for the purpose, the contouring being effected by a system of stadia and barometric levelling based on the nearest precise level lines; they are printed in from seven to eight colours.

Second, sheets covering partially settled territory; the information is compiled from any existing surveys in the territory and from correspondence; they are usually printed in four colours.

Third, sheets covering unsettled territory; these are based largely on base line surveys and sketches and are usually printed in two colours.

To date the following sheets have been published:—

Class	Scale	Number of Map sheets	Area, square miles
1	3 miles to 1 inch	36	146,590
2	3 miles " 1 inch	11	44,575
3	3 miles " 1 inch	88	338,640
	Total	135	529,805

To meet the demand of tourists and park engineering projects, fully contoured topographic maps of our National Parks are prepared at different scales to suit special requirements and areas. In addition numerous miscellaneous areas are mapped for special purposes. As far as possible these maps are made to conform to the National Topographic map sheets but in some cases this is not possible. Such maps are designed and drawn to suit particular purposes.

To assist pilots in flying over the western air mail routes, air navigation strip maps of the complete routes from Winnipeg to Calgary and Lethbridge to Edmonton, comprising 991 miles, have been printed on a scale of eight miles to one inch. The maps show clearly all natural and cultural features which may be of aid to the navigator and emphasize special aids to air navigation as light beacons, radio beacons, intermediate aerodromes, and airports. Elevations above sea level are described by spot elevations and hypsometric tints. On the back of the maps are shown profiles of the routes and large scale drawings of the aerodromes and airports.

Control and Exploration Surveys

Control surveys as a basis for topographical mapping were carried down Churchill river from Southern Indian lake to Churchill and a connecting traverse made between Burntwood and Churchill rivers. A number of geographical determinations by astronomical observation were made at far distant points throughout the Northwest Territories, which have the effect of making important geographical corrections to the map of Canada. This work was rendered possible by the co-operation of the Royal Canadian Air Force. Prior to the use of air transport for surveying it would have been impracticable to obtain all this information in one season.

At all observation stations and at numerous points along control traverses it is the practice of the Topographical Survey to establish permanent monuments for future reference. These monuments usually take the form of a bronze rock post, duly marked with a serial number by which it may be identified, and a stone mound. The above monuments add greatly to the value of control surveys, because the greater part of control survey work is done in unsurveyed territory where the monuments thus established are the only points of reference to which local surveys or mineral discoveries may be connected.

In making control survey traverses, it is the policy of the Topographical Survey to adhere as closely as possible to the principle of closed circuits, which affords the best means of checking the accuracy of the work. This principle is applied to the control for a single map sheet, but it is also applied in a much more general way by arranging for extended circuits covering large areas. In Northern Canada where there are no basic surveys of any kind, the Topo-

graphical Survey has developed the policy of determining by astronomical observations the geographical positions of numerous points, which are used as terminal points, between any two of which a control traverse may be closed.

In theory no problem could appear more simple than the astronomic determination of longitude but as a matter of practice in the past the great difficulty consisted in transferring the exact local time of the reference meridian to that of the desired point of observation. When the two points of observation were connected by telegraph, the operation was comparatively easy, but in northern Canada explorers and surveyors were obliged to depend on "carried" time, with watches or chronometers which had been carefully set and rated at the point of known longitude and then transported by canoe and packhorse, for months of travel, during which they were subject to violent changes of temperature and moisture, to the field of operations. No check could be obtained on the error and rate of these watches until their return to the point of departure, perhaps one or two years later.

One of the most revolutionary changes which has been effected by the discovery of wireless telegraphy is the fact that, by the use of a radio receiving set, any point on the earth's surface may now be said to be in telegraphic communication with one or more of the powerful transmitting stations established throughout the world. As a result of the above change and the coincident development of aerial transportation, it is now possible for a surveyor to be set down on an unknown lake, hundreds of miles perhaps from the nearest surveyed territory, and determine his true astronomic position in a few hours with a degree of accuracy hitherto quite unknown.

For many years the Topographical Survey has been engaged on topographical surveys in the Northwest and Yukon Territories. Some of the earlier surveys, including those made by Wm. Ogilvie, D.L.S., of Yukon river and its tributaries in 1887-88 and of Liard and Fort Nelson rivers in 1891, were rather of an exploratory nature than of a character to furnish control for general topographical mapping, but it is a significant fact that these old surveys still represent the best and most reliable survey information that we have of these great rivers.

After the adoption of the National Topographic series of maps, providing for a standardized map system for the whole of Canada, the methods used to provide survey control became a matter of great importance and have been carefully studied in the light of each season's experience with a view to the increase of efficiency in relation to its cost. If the area is one which is accessible by good waterways, it is possible to send in a full-sized traverse party depending on canoes for transport. If, on the other hand, the area is such that the use of water transportation would take so long as to materially shorten the working season and create excessive costs of wages and maintenance, it is necessary to reduce the size of the party with a view to its transportation by air.

One rather peculiar difficulty in connection with astronomic observing in high latitudes during the summer arises from the almost total absence of darkness, which makes it impossible to see stars of small magnitude. The effect of this disability is to cut down the available number of stars so materially, that different methods of observation, requiring a smaller number of stars, are being worked out, together with the necessary tables of star places and formulae for reduction.

While most of the topographically mapped areas for which control has had to be provided naturally occur in the southern portions of Canada, and include sheets in every province of the Dominion, the following are some of the major control surveys that have been made in Northern Canada within the past ten years:—

Great Slave lake, including Lockhart river and Artillery lake.

Parts of Hay and Marian rivers, tributary to Great Slake lake.

Mackenzie river from Great Slave lake to its mouth, 1,100 miles.
Great Bear river and part of Great Bear lake.
Churchill river and some of its tributaries, including Reindeer river and lake.
Fond du Lac river, Wollaston lake, and Cochrane river.

Beside the above surveys, representing more than 30,000 miles of traverses, determinations of astronomic position have been made by the Topographical Survey at many widely separated points not connected by traverse, including Baker lake at the head of Chesterfield inlet, Coppermine river, Albany river, Dubawnt lake, Athabaska lake, and many others.

Many field surveys were made in 1931 by other organizations for the express purpose of furnishing control for the production of the maps of this Survey.

The Geodetic Survey of Canada made an astronomical and triangulation survey of part of the Belcher islands in Hudson bay.

The Geological Survey of Canada sent a topographical survey party into the Great Bear Lake area, as a result of which it has been possible to produce an urgently needed map of the new mining district in time for the present season's explorations and development.

The Ontario Government maintained parties in the field to provide topographic mapping control in the Port Arthur and Algonquin Park areas, besides making available for the use of the Branch all the surveys made in the Moose River district along the newly constructed Timiskaming and Northern Ontario railway.

The Manitoba Government sent out a survey party in order to provide control for a map of Churchill and its vicinity.

The British Columbia Government maintained two parties in the field, one in the Quesnel area and another on Vancouver island, in order to provide control for map sheets that have been undertaken.

Physical Testing Laboratory

On August 7, 1931, the Physical Testing Laboratory was transferred from the Topographical Survey to the National Research Council of Canada as a functioning unit, together with its staff, equipment and duties, it being provided that the transfer was to take effect as from April 1, 1931. Under the terms of the transfer it was arranged that the valuable work performed by the laboratory should be continued, both for the Topographical Survey and for other branches of the Government service.

The Physical Testing Laboratory was established in 1912 by the Topographical Survey to test, examine and adjust instrumental equipment, including standards of length which are required by statute to be tested, stamped and certificated by the Surveyor General.

Since its inception the work of the laboratory has developed greatly. At the time of the transfer, the laboratory furnished the principal authority in Canada for the testing, calibration and certification of instruments of precision and its resources were made use of by the Departments of National Defence, National Revenue, Public Works, Trade and Commerce, Agriculture, Mines, and Pensions and Health as well as the various branches of the Department of the Interior.

The present equipment includes a comparator building on McKay street for the testing of measures of length. This building was specially constructed with a view to equalization of temperature and is equipped with the most modern appliances for the microscopic comparison of steel or other tapes with standard measures of length, so that its facilities are probably equal to those which can be obtained anywhere.

Precise Declination Surveys

During the year 752 measurements of the declination of the compass needle were made, bringing the total number to date up to approximately 30,000. The work was carried on in close co-operation with the Meteorological Service of Canada, the Dominion Observatory, the Dominion Lands Administration, and various provincial governments and surveyors, in order to make the best use of all work done.

The resulting information is published on declination charts on the various maps, including the map sheets of the National Topographic series. During the year a new declination map, "Lines of Equal Magnetic Declination and Annual Change in Canada for 1932," was compiled. This is the only declination chart for Canada and is published by this Survey every five years, 1907-12-17-22-27-32. During the year a new horizontal force map, "Lines of Equal Magnetic Horizontal Force and Annual Change in Canada for 1932," was compiled. This is the only such map for Canada, and shows the directive force exerted on the compass needle by the earth's magnetic field.

As in the past all magnetic instruments were standardized at the beginning and the end of the season at the Magnetic Observatory, Agincourt, Ont., through the courtesy of the Director, Meteorological Service of Canada; and thus all results were reduced to International Magnetic Standard.

Researches were made on diurnal inequality and secular change, and a paper prepared for the Fifth Pacific Science Congress, entitled, "Magnetic Secular Change Tables for British Columbia and Yukon Territory."

A very large amount of compass data was supplied to various Dominion and provincial Government offices and to the public.

Following is a table showing the precise declination observations made during the year.

MAGNETIC DECLINATION OBSERVATIONS

Observers	Observations	Province	Observers	Observations	Province
	Number			Number	
Messrs. Beatty & Beatty, O.L.S.	23	Ont.	C. Rinfret, D.L.S.	22[3]	Que.
Messrs. Phillips & Benner, O.L.S.	43	"	K. F. McCusker, D.L.S.	17	B.C. and Jasper Pk.
Messrs. Speight & Van Nostrand, O.L.S.	15	"	M. P. Bridgland, D.L.S.	5	Alta.
J. A. S. King, O.L.S., D.L.S.	76[1]	"	E. S. Fry, D.L.S.	14	N.W.T.
H. W. Sutcliffe, O.L.S.	12	"	J. A. Calder, D.L.S.	13	Sask.
E. L. Moore, O.L.S.	16	"	W. Christie, D.L.S.	12	"
J. T. Ransom, O.L.S.	18	"	J. Hardouin, D.L.S.	2	Man.
E. L. Cavana, O.L.S.	92	"	C. S. Macdonald, D.L.S.	90[4]	"
J. T. Coltham, O.L.S.	21	"	A. Dumas, Q.L.S.	35	Ont.-Que. bdy.
R. C. Purser, O.L.S., D.L.S.	3	"	J. D. Soper	168[5]	Baffin Id., N.W.T.
J. Carroll, D.L.S.	42[2]	7 Alta. 35 Sask.	Messrs. Phillips, Stewart and Phillips, S.L.S.	13[6]	Sask.
			Total	752	

[1] Including repeat observations at Moose Factory (now called Moosonee).
[2] Including 2 repeat observations in Saskatchewan and establishing 2 new meridian stations in Alberta and 9 in Saskatchewan.
[3] Including 1 repeat observation.
[4] Including 3 repeat observations and establishing 2 new meridian stations.
[5] Including new meridian station at Lake Harbour, Baffin island, N.W.T.
[6] Including repeat observations at University of Saskatchewan.

Legal Surveys

Owing to the transfer of the natural resources in 1930 there was not the usual field surveys program in 1931, but there was still considerable activity in land surveys.

A portion of the villa lot section of Banff, surveyed originally by E. Stewart, D.L.S., in 1889, required to have the boundaries redetermined. The surveyor found it impracticable to redetermine the curvilinear boundaries from the monuments on the ground and from the incomplete data shown on the old plan. He referred the problem to this office for detailed instructions and, after considerable research, a series of tangential curves was determined that would pass through all of the monuments found on the ground. The data for these curves was furnished to the surveyor, who laid down the boundaries on the ground, after which the plans were completed for confirmation and registration.

Some of the unsurveyed boundaries of the National Parks of Canada were opened out. Four Dominion land surveyors formerly in the employ of the department were engaged and instructions were prepared and issued for the survey of the Banff Park boundary at the valleys of Goat creek, and Spray, Bow, Dormer, Panther, and Red Deer rivers; for the survey of the boundary of Jasper park at the valleys of Athabaska river, Moosehorn creek, and Rock creek, and for the survey of the north boundary of Prince Albert park and of the unsurveyed portions of its east, south, and west boundaries. The returns of survey were examined and preparation of the plans of survey was begun.

In connection with development at Riding Mountain park, one of the surveyors of this branch was sent with instructions to lay out and monument some 350 lots at the headquarters on the south side of Clear lake. The returns of this survey have been examined and the plan of survey has been compiled. This surveyor also retraced some thirty miles of the boundary of the park where the monuments of the original survey were so old as to be difficult to find. Other surveys made for the National Parks were historic sites at Bridgetown, N.S.; at Fort Nerepis, N.B.; at Temiscouata Portage, P.Q., and at a point near Guelph, Ont.

Several plans of survey of parcels of the penitentiary site at Edmonton were examined for confirmation and registration.

In connection with the transfer of the natural resources, after the departmental decision to turn over the field notes of confirmed surveys to the western provinces, the many thousands of records were assorted and those pertaining to Manitoba and Alberta were handed over for shipment. Those for Saskatchewan and British Columbia are not required by those provinces at present. The change of jurisdiction in matters relating to surveys has occasioned many inquiries as to Dominion practice in regard to all of which the fullest explanations, advice, or assistance have been given.

The usual surveys of mineral claims and surface lots in Yukon Territory were received and examined for approval.

Probably the most important event relating to legal surveys was the mineral discovery at Great Bear lake. The richness of the ores in this locality foreshadow the improvement of transportation facilities into the north which in turn will encourage the development of other important mineralized areas already located. As a result there have been a number of inquiries respecting legal surveys of natural resources within the Northwest Territories. Toward the close of the fiscal year instructions were prepared and sent to one surveyor for the survey of one hundred mineral claims at Great Bear lake.

Registration, Records and Distribution Division

The work of this division consists, in general, of the registration and recording of all the various returns of surveys received from the surveyors in the field; furnishing copies of field notes and traverse plots as required; dealing with technical correspondence relating to the surveyors' field notes; the storing and distributing of the official plans of townships, townsites, and settlements; the distribution of the various maps and publications issued by the branch, and other related work.

The following survey returns were received for examination from surveyors in the field and were entered in the various registers: 307 books of field notes, 141 plans, 276 miscellaneous returns, and 25,960 copies of aerial photographs which were used by surveyors in the field.

On the completion of the examination, the field books and various original plans are placed on record. The signed copy of each official plan issued and one copy of each map issued are also recorded. During the year 382 new field books and 405 plans and maps were placed on official record. To date 21,462 books and 38,156 plans and maps have been placed on record. During the year 7,342 books of field notes of the subdivision of lands now entirely under the jurisdiction of the provincial governments were transferred to the provinces of Alberta and Manitoba, 4,860 going to Alberta and 2,482 to Manitoba.

The work of dealing with requests for technical information relating to surveys, survey records and official plans was carried on as usual. Requests are received from various branches of the federal and provincial governments, surveyors and engineers, law firms and the general public, and relate to survey monuments, conflicting boundaries, and similar subjects. This involves not only the searching of the surveyors' field notes and files but in many cases the supplying of copies of the notes and plans. When required for the law courts the copies of the notes and plans are officially certified. During the year copies of 316 railway right of way plans were furnished to the province of Alberta. The number of technical requests and inquiries dealt with was 719. The number of copies of official plans of townships, townsites and settlements distributed during the twelve months was 12,860.

The various maps, reports, technical pamphlets and other publications of the Survey were distributed throughout the year as usual. During this period there were distributed 38,822 maps and 2,993 copies of publications. In the distribution of these, 10,988 requests were dealt with. There are at present available for distribution from this Survey 779 different maps, 94 various reports and pamphlets and about 7,000 official plans of the various townships, townsites and settlements.

Map Publication

This division consists of three sections, drafting, photo-mechanical, and lithographic. In general, the drafting section prepares the original drawings, which are photo-zincographed by the photo-mechanical section, while the lithographic section prints the impressions from the zinc plates.

The drafting section lays down the projections on which the surveys divisions compile the details of the maps or plans from which are then made accurate and neat drawings which are capable of being reproduced for the final map sheets. The photo-mechanical section must make correct copies to the exact scale of reproduction. The lithographic section prints the impressions and the proper choice of colours and the care with which they are "registered" in correct position have much to do with the final results.

In addition to the regular map work, the drafting section completed several miscellaneous maps and other tasks including certificates for the Board of Examiners for Dominion Land Surveyors. Besides making the zinc plates for the use of the lithographers, the photo-mechanical section does a great deal of reducing and enlarging to scale for the use of the surveys divisions and for the drafting section.

Board of Examiners for Dominion Land Surveyors

The Board of Examiners for Dominion Land Surveyors held two meetings during the year. The first was a special meeting lasting from Monday, April 27, 1931, to Saturday, May 29, 1931, inclusive, during which examinations were held at Ottawa, Montreal and Saskatoon. The second was the regular annual

meeting called for by section 9 of the Dominion Lands Surveys Act. It began on Monday, February 8, 1932, and lasted to Tuesday, March 10, 1932, inclusive. During this meeting, examinations were held at Kingston and Edmonton.

The total number of candidates who presented themselves at the examinations was forty-nine. Of these twenty-nine tried the Preliminary examination, sixteen tried the examination for Levellers and four tried the Final examinations.

Fifteen candidates were successful at the Preliminary examination as follows:—

Archambault, R.	Drury, C. M.	Lester, C. A.
Baptie, P.B.	Flexman, J. K.	McLaughlin, W. G.
Boileau, J. A.	Gamble, S. G.	Park, A. C.
Bludoff, Peter S.	Holloway, J. N.	Robert, R. A.
Dorais, G.	Hayhoe, H. L.	Tasse, G. R.

Four candidates were successful at the Final examination as follows: Bereskin, A. I.; Desaulniers, E.; Leak, R. W.; McDonald, M. V.

One candidate was successful at the Leveller's examination as follows: Jolley, M. P.

The time of the board during the meetings was largely taken up with the reading and valuation of the candidates' answer papers. Complete sets of question papers to be used at the succeeding examinations were also prepared.

Three standard measures of length were issued during the year.

Geographic Board of Canada

A number of changes in the personnel of the board occurred during the year. Messrs. J. E. Chalifour, J. D. Craig, and O. S. Finnie retired from their positions in the Department of the Interior, and their positions on the board consequently became vacant. To fill these vacancies the following new appointments were made: F. C. C. Lynch, Director, National Development Bureau, Department of the Interior; A. M. Narraway, Associate Director, Topographical Survey and Chief Aerial Officer, Department of the Interior; and Noel J. Ogilvie, Director, Geodetic Survey of Canada, Department of the Interior. Lt.-Col. P. deL. D. Passy retired from the position of General Staff Officer, Surveys, Department of National Defence, and his position on the board was filled by the appointment of his successor in the Department of National Defence, Major E. L. M. Burns. Dr. William S. Carter, the New Brunswick representative, died and the vacancy was filled by the appointment of Dr. A. S. McFarlane, Chief Superintendent of Education, Fredericton. The Saskatchewan representative, John W. McLeod, submitted his resignation and the new representative is Major John Barnett, Deputy Minister, Department of Natural Resources, Regina. The vacancy of the position as representative for Alberta which had carried over from the previous year was filled by the appointment of Colin G. Groff, Acting Librarian, Provincial Library, Edmonton.

During the early part of the year O. S. Finnie was acting Chairman, but later W. H. Boyd, B.A.Sc., M.E.I.C., F.R.C.S., Chief Topographical Engineer, Geological Survey, Department of Mines, was elected permanent chairman and the new executive committee of three was elected consisting of A. Dickison, Chief, Drafting and Reproducing Division, Geological Survey of Canada, Department of Mines; F. C. C. Lynch, Director, National Development Bureau, Department of the Interior; and F. H. Peters, Surveyor General, Department of the Interior.

The duties of the board are to advise and rule on all questions concerning geographic names in the Dominion, which arise in the departments of the federal public service or in the public services of any province which has under-

taken to be guided by the decisions of the board, or which are referred to it from any other source. Names which require approval or a ruling of the board include those that are new, duplicated, of doubtful orthography, contrary to local usage, of doubtful origin, of doubtful application or controversial, or which require revision. Certain principles of nomenclature have been formulated by the board and the board endeavours to have them generally adopted.

LIST OF MAP SHEETS OF THE NATIONAL TOPOGRAPHIC SERIES AND THE SECTIONAL MAP SERIES ISSUED 1931-32, AND IN HAND ON MARCH 31, 1932

ISSUED 1931-32

Prov.	No.	Series	Name	Scale	Latitude	Longitude	Remarks
N.S.....	20-P/NE..	N.T....	Port Mouton.....	2	43° 30′ to 44° 00′	64° 00′ to 65° 00′	(*b*)
	21-B/SE...	N.T....	St. Mary Bay.....	2	44° 00′ to 44° 30′	66° 00′ to 67° 00′	(*b*)
Que.....	21-M/SE.	N.T....	Beaupré.....	2	47° 00′ to 47° 30′	70° 00′ to 71° 00′	(*a*)
	31-I/9	N.T....	Grondines.....	1	46° 30′ to 46° 45′	72° 00′ to 72° 30′	(*a*)
Ont.....	41-H/NE	N.T....	Byng Inlet.....	2	45° 30′ to 46° 00′	80° 00′ to 81° 00′	(*b*)
	52-B	N.T....	Quetico.....	4	48° 00′ to 49° 00′	90° 00′ to 92° 00′	(*b*)
	52-C	N.T....	Rainy Lake.....	4	48° 00′ to 49° 00′	92° 00′ to 94° 00′	(*b*)
	52-D	N.T....	Rainy River.....	4	48° 00′ to 49° 00′	94° 00′ to 96° 00′	(*b*)
	52-E	N.T....	Kenora.....	4	49° 00′ to 50° 00′	94° 00′ to 96° 00′	(*b*) reprint
	52-G	N.T....	Ignace.....	4	49° 00′ to 50° 00′	90° 00′ to 92° 00′	(*b*)
Man.....	63-N	N.T....	Kississing.....	4	55° 00′ to 56° 00′	100° 00′ to 102° 00′	(*b*) revised edition.
	63-SE	N.T....	Lake Winnipeg....	8	52° 00′ to 54° 00′	96° 00′ to 100° 00′	(*b*)
	271	Sect....	Mossy Portage....	3	52° 29′ to 53° 12′	100° 03′ to 102° 00′	(*f*) reprint
Sask.....	69	Sect....	Moose Jaw.....	3	49° 42′ to 50° 24′	104° 02′ to 106° 00′	(*d*) reprint
	270	Sect....	Pasquia.....	3	52° 29′ to 53° 12′	102° 00′ to 104° 02′	(*e*) reprint
	369	Sect....	Montreal Lake....	3	53° 53′ to 54° 36′	104° 04′ to 106° 01′	(*f*) reprint
Alta.....	82-I/13	N.T....	Calgary Southeast	1	50° 45′ to 51° 00′	113° 30′ to 114° 00′	(*a*)
	82-N/NE.	N.T....	Mistaya.....	2	51° 30′ to 52° 00′	116° 00′ to 117° 00′	(*a*)
	82-O/1	N.T....	Calgary North-west.	1	51° 00′ to 51° 15′	114° 00′ to 114° 30′	(*a*)
	14	Sect....	Pincher Creek....	3	49° 00′ to 49° 43′	113° 59′ to 116° 02′	(*f*) reprint
	64	Sect....	Porcupine.....	3	49° 41′ to 50° 25′	113° 59′ to 116° 04′	(*f*) reprint
	116	Sect....	Rainy Hills.....	3	50° 23′ to 51° 06′	109° 59′ to 112° 06′	(*f*) reprint
	213	Sect....	Athabaska.....	3	51° 47′ to 52° 30′	116° 00′ to 118° 00′	(*f*) reprint
	364	Sect....	Fort Assiniboine..	6	53° 57′ to 54° 36′	113° 59′ to 116° 07′	
	563	Sect....	Notikewin.....	3	56° 40′ to 57° 23′	116° 03′ to 118° 00′	(*f*) reprint

IN HAND MARCH 31, 1932

N.S.....	11-E/SE...	N.T....	Sunnybrae.....	2	45° 00′ to 45° 30′	62° 00′ to 63° 00′	(*b*)
	20-P/NW.	N.T....	Shelburne.....	2	43° 30′ to 44° 00′	65° 00′ to 66° 00′	(*b*)
	21-A/SE	N.T....	Bridgewater.....	2	44° 00′ to 44° 30′	64° 00′ to 65° 00′	(*b*)
	21-A/SW	N.T....	Rossignol.....	2	44° 00′ to 44° 30′	65° 00′ to 66° 00′	(*b*)
N.B.....	21-H/SW	N.T....	St. Martins.....	2	45° 00′ to 45° 30′	65° 00′ to 66° 00′	(*b*)
	21-I/SE	N.T....	Moncton.....	2	46° 00′ to 46° 30′	64° 00′ to 65° 00′	(*a*)
	21-I/SW	N.T....	Chipman.....	2	46° 00′ to 46° 30′	65° 00′ to 66° 00′	(*b*)
	21-I/NW	N.T....	Newcastle.....	2	46° 30′ to 47° 00′	65° 00′ to 66° 00′	(*b*)
Que.....	21-L/NW	N.T....	Quebec.....	2	46° 30′ to 47° 00′	71°00′ to 72° 00′	(*a*)
	31-F/NE	N.T....	Fort Coulonge....	2	45° 30′ to 46° 00′	76° 00′ to 77° 00′	(*b*)
	31-G/NE	N.T....	Lachute.....	2	45° 30′ to 46° 00′	74° 00′ to 75° 00′	(*b*)
	31-G/NW	N.T....	Buckingham.....	2	45° 30′ to 46° 00′	75° 00′ to 76° 00′	(*b*)
	31-I/NE	N.T....	Grand Mere.....	2	46° 30′ to 47° 00′	72° 00′ to 73° 00′	(*b*)
	31-J/SE	N.T....	Ste. Agathe.....	2	46° 00′ to 46° 30′	74° 00′ to 75° 00′	(*b*)
	31-J/SW	N.T....	Maniwaki.....	2	46° 00′ to 46° 30′	75° 00′ to 76° 00′	(*b*)
	31-J/NW	N.T....	Mont Laurier.....	2	46° 30′ to 47° 00′	75° 00′ to 76° 00′	(*b*)
	31-K/SE	N.T....	Gracefield.....	2	46° 00′ to 46° 30′	76° 00′ to 77° 00′	(*b*)
	31-K/NE	N.T....	Tomasine.....	2	46° 30′ to 47° 00′	76° 00′ to 77° 00′	(*b*)
	31-N/NE	N.T....	Vimy.....	2	47° 30′ to 48° 00′	76° 00′ to 77° 00′	(*b*)
	31-O/NE	N.T....	Parent.....	2	47° 30′ to 48° 00′	74° 00′ to 75° 00′	(*b*)
	31-O/NW	N.T....	Choquette.....	2	47° 30′ to 48° 00′	75° 00′ to 76° 00′	(*b*)
	31-P/SE	N.T....	La Tuque.....	2	47° 00′ to 47° 30′	72° 00′ to 73° 00′	(*b*)
	32-B/SW	N.T....	Bourmont.....	2	48° 00′ to 48° 30′	75° 00′ to 76° 00′	(*b*)
	32-C/SE	N.T....	Doucet.....	2	48° 00′ to 48° 30′	76° 00′ to 77° 00′	(*b*)
	32-C/SW	N.T....	Senneterre.....	2	48° 00′ to 48° 30′	77° 00′ to 78° 00′	(*b*)
	32-D/NE	N.T....	Taschereau.....	2	48° 30′ to 49° 00′	78° 00′ to 79° 00′	(*b*)
	32-F	N.T....	Waswanipi.....	4	49° 00′ to 50° 00′	76° 00′ to 78° 00′	(*b*)

LIST OF MAP SHEETS OF THE NATIONAL TOPOGRAPHIC SERIES AND THE SECTIONAL MAP SERIES ISSUED 1931-32, and IN HAND MARCH 31, 1932—*Concluded*

IN HAND MARCH 31, 1932

Prov.	No.	Series	Name	Scale	Latitude	Longitude	Remarks
Ont.....	31-D/NW	N.T....	Orillia.....	2	44° 30′ to 45° 00′	79° 00′ to 80° 00′	(*b*)
	31-E/NE	N.T....	Algonquin.....	2	45° 30′ to 46° 00′	78° 00′ to 79° 00′	(*b*)
	31-E/NW	N.T....	Sundridge.....	2	45° 30′ to 46° 00′	79° 00′ to 80° 00′	(*b*)
	31-F/7	N.T....	Renfrew.....	1	45° 15′ to 45° 30′	76° 30′ to 77° 00′	
	31-L/SW	N.T....	North Bay.....	2	46° 00′ to 46° 30′	79° 00′ to 80° 00′	(*b*)
	31-L/13	N.T....	Timagami.....	1	46° 45′ to 47° 00′	79° 30′ to 80° 00′	
	32-D/NW	N.T....	Abitibi.....	2	48° 30′ to 49° 00′	79° 00′ to 80° 00′	(*b*)
	42-I/SW	N.T....	Coral Rapids.....	2	50° 00′ to 50° 30′	81° 00′ to 82° 00′	(*b*)
	42-L	N.T....	Nakina.....	4	50° 00′ to 51° 00′	86° 00′ to 88° 00′	(*b*)
	52-A/SW	N.T....	Twin Cities.....	2	48° 00′ to 48° 30′	89° 00′ to 90° 00′	(*b*)
	52-A/NE	N.T....	Black Bay.....	2	48° 30′ to 49° 00′	88° 00′ to 89° 00′	(*b*)
	52-A/NW	N.T....	Kaministikwia....	2	48° 30′ to 49° 00′	89° 00′ to 90° 00′	(*b*)
	52-E	N.T....	Kenora.....	4	49° 00′ to 50° 00′	94° 00′ to 96° 00′	(*b*) revision of former edition.
	52-F	N.T....	Dryden.....	4	49° 00′ to 50° 00′	92° 00′ to 94° 00′	(*b*) reprint
	52-H	N.T....	Nipigon.....	4	49° 00′ to 50° 00′	88° 00′ to 90° 00′	(*b*)
	52-J	N.T....	Sioux Lookout....	4	50° 00′ to 51° 00′	90° 00′ to 92° 00′	(*b*) reprint
	52-K	N.T....	Lac Seul.....	4	50° 00′ to 51° 00′	92° 00′ to 94° 00′	(*b*) revision of former edition.
	52-L	N.T....	Pointe du Bois....	4	50° 00′ to 51° 00′	94° 00′ to 96° 00′	(*b*) revision of former edition.
	52-P	N.T....	Miminiska.....	4	51° 00′ to 52° 00′	88° 00′ to 90° 00′	(*b*)
	52-NW	N.T....	English River....	8	50° 00′ to 52° 00′	92° 00′ to 96° 00′	(*b*)
Man.....	54-L/9	N.T....	Churchill.....	1	58° 30′ to 58° 45′	94° 00′ to 94° 30′	(*b*)
	62-O	N.T....	Gypsumville.....	4	51° 00′ to 52° 00′	98° 00′ to 100° 00′	(*b*)
	63-F	N.T....	The Pas.....	4	53° 00′ to 54° 00′	100° 00′ to 102° 00′	(*b*) reprint
	63-O	N.T....	Nelson House.....	4	55° 00′ to 56° 00′	98° 00′ to 100° 00′	(*b*)
	64-C	N.T....	Granville.....	4	56° 00′ to 57° 00′	100° 00′ to 102° 00′	(*b*)
Sask.....	64-D	N.T....	Reindeer Lake S.	4	56° 00′ to 57° 00′	102° 00′ to 104° 00′	(*b*)
	64-E	N.T....	Reindeer Lake N.	4	57° 00′ to 58° 00′	102° 00′ to 104° 00′	(*b*)
	73-H	N.T....	Prince Albert.....	4	53° 00′ to 54° 00′	104° 00′ to 106° 00′	(*b*)
	73-J	N.T....	Green Lake.....	4	54° 00′ to 55° 00′	106° 00′ to 108° 00′	(*b*)
	73-N	N.T....	Dillon.....	4	55° 00′ to 56° 00′	108° 00′ to 110° 00′	(*b*)
	73-O	N.T....	Ile-a-la-Crosse....	4	55° 00′ to 56° 00′	106° 00′ to 108° 00′	(*b*)
	74-A	N.T....	Foster Lakes.....	4	56° 00′ to 57° 00′	104° 00′ to 106° 00′	(*b*)
	74-B	N.T....	Mudjatik.....	4	56° 00′ to 57° 00′	106° 00′ to 108° 00′	(*b*)
	74-N	N.T....	Tazin Lake.....	4	59° 00′ to 60° 00′	108° 00′ to 110° 00′	(*b*)
	74-O	N.T....	Fond du Lac.....	4	59° 00′ to 60° 00′	106° 00′ to 108° 00′	(*b*)
	74-P	N.T....	Black Lake.....	4	59° 00′ to 60° 00′	104° 00′ to 106° 00′	(*b*)
	167	Sect....	Kindersley.....	3	51° 05′ to 51° 48′	108° 05′ to 110° 00′	(*d*)
Alta.....	73-L	N.T....	Lac-la-Biche.....	4	54° 00′ to 55° 00′	110° 00′ to 112° 00′	(*b*)
	82-O/NW	N.T....	Barrier Mountain.	2	51° 30′ to 52° 00′	115° 00′ to 116° 00′	(*a*)
	82-O/SW	N.T....	Banff.....	2	51° 00′ to 51° 30′	115° 00′ to 116° 00′	(*a*)
	84-H/NE	N.T....	Ells River.....	2	57° 30′ to 58° 00′	112° 00′ to 113° 00′	(*b*)
	84-H/SE	N.T....	Namur.....	2	57° 00′ to 57° 30′	112° 00′ to 113° 00′	(*b*)
	166	Sect....	Sounding Creek...	3	51° 05′ to 51° 48′	110° 00′ to 112° 07′	(*d*)
	413	Sect....	Iosegun.....	3	54° 35′ to 55° 18′	115° 57′ to 118° 01′	(*f*) reprint
	415	Sect....	Tawatinaw.....	3	54° 35′ to 55° 18′	111° 57′ to 114° 01′	(*f*) reprint
	462	Sect....	Dunvegan.....	3	55° 16′ to 56° 00′	117° 59′ to 120° 02′	(*e*) reprint
B.C.....	82-L/NE	N.T....	Revelstoke.....	2	50° 30′ to 51° 00′	118° 00′ to 119° 00′	(*a*)
	82-L/NW	N.T....	Shuswap.....	2	50° 30′ to 58° 00′	119° 00′ to 120° 00′	(*a*)
	82-N/SE	N.T....	Yoho.....	2	51° 00′ to 51° 30′	116° 00′ to 117° 00′	(*a*)
	82-N/SW	N.T....	Glacier Park.....	2	51° 00′ to 51° 30′	117° 00′ to 118° 00′	(*a*)
	92-F/NW	N.T....	Comox.....	2	49° 30′ to 50° 00′	121° 00′ to 122° 00′	(*a*)
	92-G/SE	N.T....	Port Moody.....	2	49° 00′ to 49° 30′	122° 00′ to 123° 00′	(*a*)
	92-G/SW	N.T....	Vancouver.....	2	49° 00° to 49° 30′	123° 00′ to 124° 00′	(*a*)
	92-L/SE	N.T....	Nimpkish Lake...	2	50° 00′ to 50° 30′	126° 00′ to 127° 00′	(*a*)
	93-A/NW	N.T....	Quesnel.....	2	52° 30′ to 53° 00′	121° 00′ to 122° 00′	(*a*)
	93-K/SE	N.T....	Fraser Lake.....	2	54° 00′ to 54° 30′	124° 00′ to 125° 00′	(*b*)
N.W.T..	55-K	N.T....	Ranken Inlet.....	4	62° 00′ to 63° 00′	92° 00′ to 94° 00′	(*c*)
	85-NE & NW	N.T....	Rae.....	8	62° 00′ to 64° 00′	112° 00′ to 120° 00′	(*c*)
	86-J & K	N.T....	Hunter Bay, Coppermine River..	4	66° 00′ to 67° 00′	114° 00′ to 118° 00′	(*c*)
	86-N & O	N.T....	Dismal Lakes—Coppermine.....	4	67° 00′ to 68° 00′	114° 00′ to 118° 00′	(*c*)
	86-SE & SW	N.T....	Camsell River....	8	64° 00′ to 66° 00′	112° 00′ to 120° 00′	(*c*)

NOTES.—Work performed on those sheets marked "In Hand" ranges throughout the various stages from the commencement of the compilation in the office to the preparation of the final lithographic plates for printing. Some sheets upon which very little work has so far been done are not included in the above list.

Where a map sheet extends into more than one province, it is listed under one province only.

Under the column of "Remarks" the following are the meanings attached to the symbols used:—

(*a*) National Topographic Series—Standard Edition—Topographical information complete.

(*b*) National Topographic Series—Provisional Edition—Topographical information complete or nearly so (except for contours), over all or greater portion of sheet.

(*c*) National Topographic Series—Exploratory Edition—Topographical information from exploration surveys, or where control is inadequate, no contours or contours conjectural only.

(*d*) Sectional Map Series—New Series Edition—Detailed topographical information in eight colours, including contours.

(*e*) Sectional Map Series—Intermediate Series Edition—Topographical information in five colours not so complete, contours, when shown, usually approximate only.

(*f*) Sectional Map Series—Old Series Edition—Generally topography only, in from one to four colours.

LIST OF MISCELLANEOUS MAP SHEETS ISSUED 1931-32 AND IN HAND MARCH 31, 1932*

ISSUED 1931-32

Province	Map	Scale	Remarks
Quebec	Ottawa-Gatineau District	1	Two printings of this map were made.
Ontario	Ottawa-Kingston map	2	Perth-Kingston sheet.
Manitoba	Churchill River Air Navigation map	8	
Saskatchewan	Prince Albert Park	1 to 150,000	
	Regina to Lethbridge (Regina to Tompkins)	8	Aerial navigation map.
	Regina to Lethbridge (Tompkins to Lethbridge)	8	Aerial navigation map.
Alberta	Lethbridge to Edmonton (Lethbridge to Calgary)	8	Aerial navigation map.
	Lethbridge to Edmonton (Calgary to Edmonton)	8	Aerial navigation map.
	Wood Buffalo Park	8	Exploratory.
N.W.T.	Eastern end of Great Bear lake	2	
	Great Slave Lake, Western sheet	6	Reprint
Miscellaneous	Orographical map of Canada and Newfoundland.	125	
	Average date of the start and end of flying season	.....	For use of aerial navigators.
	Maple Creek and Cypress soil maps	3	Printed for University of Saskatchewan.
	Swift Current and Wood Mountain soil maps	3	Printed for University of Saskatchewan.

IN HAND MARCH 31, 1932

Quebec	Chicoutimi District	2	
Ontario	Sudbury District	2	
Manitoba	Riding Mountain Park	3	
Saskatchewan	Saskatchewan South	12·5	Showing contours.
	Medicine Hat, N.M. 12	1 to 1,000,000	International map of the world.
Alberta	Banff Park	3	
N.W.T.	Great Bear Lake	8	
	Belcher Islands	4	
	North Atlantic Ocean	150	

* NOTE.—A number of miscellaneous map sheets issued as indexes and for various other purposes in connection with the work of the branch are not included.

Issued 1931-32

Province	Map	Scale	Remarks
Quebec	Ottawa–Gatineau District	1	Two printings of this map were made.
Ontario	Ottawa–Kingston map	2	Perth–Kingston sheet.
Manitoba	Churchill River Air Navigation map	8	
Saskatchewan	Prince Albert Park	1 to 190,000	
Alberta	Regina to Lethbridge (Regina to Tompkins)	8	Aerial navigation map.
	Regina to Lethbridge (Tompkins to Lethbridge)	8	Aerial navigation map.
	Lethbridge to Edmonton (Lethbridge to Calgary)	8	Aerial navigation map.
	Lethbridge to Edmonton (Calgary to Edmonton)	8	Aerial navigation map.
N.W.T.	Wood Buffalo Park	8	Exploratory.
	Eastern end of Great Bear Lake	2	
	Great Slave Lake, Western sheet	6	Reprint
Miscellaneous	Orographical map of Canada and Newfoundland	125	
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